

ESTIMATING THE CAUSAL EFFECT OF ENFORCEMENT ON MINIMUM WAGE COMPLIANCE:

The Case of South Africa

HAROON BHORAT*

Development Policy Research Unit
haroon.bhorat@uct.ac.za

RAVI KANBUR

Cornell University
sk145@cornell.edu

NATASHA MAYET

Development Policy Research Unit
natasha.mayet@uct.ac.za

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ABSTRACT

This paper attempts to estimate the causal effect of government enforcement on compliance with minimum wages in South Africa, a country where considerable non-compliance exists. The number of labour inspectors per capita is used as a proxy for enforcement, whilst non-compliance is measured using an index of violation that measures both the proportion of individuals violated, as well as the average depth of individual violation. Due to the potential simultaneity between enforcement and compliance, the number of labour inspectors is instrumented by the number of non-inspectors. The results suggest that there are a variety of factors impacting on violation, including firm-level, sectoral and spatial characteristics. One of the key determinants of violation is found to be the local unemployment rate. However, the number of labour inspectors is found to be insignificant in determining non-compliance.

KEY WORDS: Minimum Wage, Enforcement, Compliance, Depth of Violation, South Africa

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1. INTRODUCTION

A key problem affecting wage earners in developing countries is the issue of law enforcement, particularly the enforcement of legislation pertaining to minimum wages. There are a number of studies that investigate the problem of non-compliance amongst employers with minimum wage laws in developing countries (Basu, Chau and Kanbur, 2007; Andalón and Pagés, 2008). However, there is little empirical research on the determinants of non-compliance, particularly on the effects of enforcement on compliance with minimum wage laws. This paper attempts to investigate the determinants of non-compliance with minimum wage laws in South Africa, a country where an estimated 44% of employees receive sub-minimum wages (Bhorat, Kanbur, and Mayet, 2010a). The number of labour inspectors is used as a measure of enforcement in order to estimate the causal effect of enforcement on compliance. Whilst the results do not show a significant effect of the number of labour inspectors on compliance, they suggest that local labour market characteristics may play an important role. Overall then, this paper contributes to the literature on the issue of non-compliance with minimum wage regulations in developing countries, and is the first attempt to undertake such an analysis of the determinants of non-compliance for South Africa.

As Ronconi (2010) notes, there are two key challenges in estimating the effect of enforcement on compliance. Firstly, finding appropriate measures for both enforcement and compliance is problematic. In this paper, we measure violation or non-compliance of minimum wages using a family of indices of violation introduced in Bhorat, Kanbur and Mayet (2010a), which capture both the incidence and the depth of violation. Enforcement is measured using the number of labour inspectors per capita as a proxy.

Secondly, there is a problem of endogeneity due to the potentially simultaneous relationship between enforcement and compliance. On the one hand, enforcement is likely to increase compliance due to firms being more likely to comply if their probability of being caught is higher. On the other hand, a government agency is likely to increase the number of inspectors or enforcement resources in response to low compliance levels. This paper attempts to deal with this endogeneity using the number of non-inspectors as an instrument for the number of labour inspectors.

The rest of the paper is structured as follows. Section 2 below attempts to provide a brief summary of the issue of minimum wage violation in South Africa and the measure of violation. Section 3 describes some of the key variables used in the estimation of the causal effect of enforcement on compliance. Section 4 provides a description of the data and methodology used. Section 5 presents the econometric results of the determinants of violation using an instrumental variable approach. The final section, Section 6, concludes.

2. MINIMUM WAGE VIOLATION IN SOUTH AFRICA

In South Africa, minimum wages, known as sectoral determinations, are set by the Employment Conditions Commission, which is a representative body within the Department of Labour (DoL) of South Africa. The minimum wages set are sector-occupation-location specific. As shown in Bhorat, Kanbur, and Mayet (2010a, b) however, levels of minimum wage violation in South Africa are considerably high, with 44% of covered workers earning below the legal minimum wage in 2007. This measure seems high compared with other countries: For instance in Argentina compliance with the minimum wage is 95% (Ronconi, 2008), whilst in Kenya non-compliance is estimated at around 17% for salaried non-agricultural workers (Andalón and Pagés, 2008)¹.

In this paper, we use an index of violation introduced in Bhorat, Kanbur, and Mayet (2010a) to measure violation. Derived from the Foster-Greer-Thorbecke (1984) poverty measures, this index is used to measure the percentage of covered workers receiving sub-minimum wages, as well as the depth of violation, namely, the average gap between the stipulated minima and the actual wage paid. The index of violation has the following form:

$$V_a = E\{[(w^m - w)/w^m]^a\}$$

1 It is worth noting however, that these estimates are not directly comparable as the measurement of compliance differs by country. Therefore, these estimates must be interpreted with caution.

where w denotes wage, w^m denotes the relevant minimum, α is an index that emphasizes concern on the depth of violation, and E is the expectation operator with respect to the wage distribution in the sector to which w^m applies. When $\alpha = 0$, the index collapses to the standard measure of violation—the percentage of covered workers earning sub-minimum wages. When $\alpha = 1$, the index captures the average depth of violation². Whilst V_0 measures the percentage of workers violated, that is, earning below the minimum, the ratio (V_1 / V_0) facilitates the interpretation of V_1 , since it denotes the percentage shortfall of the average wage of violated workers from the minimum wage. Put differently, violated workers in this sample are earning on average (V_1 / V_0) below the relevant minima.

In Bhorat, Kanbur, and Mayet (2010b), the authors attempt to estimate violation of minimum wages for the first time in South Africa using detailed matching of occupational, sectoral and locational codes in the 2007 Labour Force Survey (Statistics South Africa) to the gazetted minimum wages³. Non-compliance is highest within the Security sector, with worryingly high estimates of nearly 70% in some areas in 2007, followed by the Farm and Forestry sectors (55% and 53% respectively). Furthermore, their results show that occupation as well as the location of employment matters in the level and depth of violation observed. Since the pattern of violation is not uniform across various sectors, occupations, and locations, it is important to understand the determinations of violation in order to attempt to explain the variation in non-compliance within the country.

Another interesting result observed in the violation estimates for South Africa is that the pattern of violation changes depending on whether we measure violation as the proportion of individuals earning below the minimum or as the shortfall of the wages of an individual from the minimum. For instance, whilst the proportion of Domestic workers violated (39%) is lower than that of Farm workers (55%), the depth of violation for these two cohorts is similar (30% and 33% below the minima respectively). Another example is the Civil Engineering sector, which yields the lowest estimate for workers earning below the sector minimum (9%), but the highest depth of violation within the sample (42%). This result suggests both the share of workers below the minima and the distance of these workers below the minima matter for policy makers, as does understanding the factors contributing to both the incidence and the depth of violation. Therefore, in our analysis that follows, the determinants of both the probability of an individual being violated, as well as of the depth of violation, will be investigated.

3. VARIABLE CHOICE

Whilst the literature suggests that enforcement increases compliance, there is little empirical research measuring the effects of enforcement on compliance. Ronconi's (2010a) study on Argentina constitutes one of the first attempts to empirically estimate the correlation between government enforcement and compliance with labour regulations in a developing country. Using data from 1995 to 2002, he attempts to analyse the statistical effect of enforcement on compliance using a two stage least squares (2SLS) estimation procedure. Ronconi uses the number of labour inspectors per capita working in provincial public enforcement agencies as a proxy for enforcement activity. He measures the extent of compliance by the percentage of private sector employees receiving legally mandated benefits, such as wages at the statutory minimum. Enforcement, as measured by the number of labour inspectors, was found to be positively associated with the extent of compliance.

In South Africa, the DoL uses a team of labour inspectors whose job is to enforce compliance with these sectoral determinations. Inspections in most cases are triggered by complaints by clients (reactive inspections), whilst

2 Increasing the value of the parameter α places higher emphasis on larger violations.

3 The sectoral minima issued by the DoL are specific to the location of the workers. Areas are designated as types A, B, C, etc. This demarcation was conducted on the basis of the average household income recorded for the municipal area concerned in the 1996 census:

A – Average income greater than R24, 000 per annum
B – Average income between R12, 000 and R24, 000 per annum
C – Average income less than R12, 000 per annum

high risk sectors are identified at the national level and targeted through focused “blitz inspections”. The National Department of Labour sets the allocations for the number of labour inspectors across the 9 provinces in the country. In 2007, there were in total 782 labour inspectors employed in the country, or in other words, 59 inspectors per million workers⁴. Data on enforcement activities in South Africa, however, is quite limited. Due to limited information on enforcement activities, the number of labour inspectors in 2007 at the provincial level was the best measure available at the time of this study to estimate the effect of enforcement on compliance.

Table 1 presents means and standard deviations for the measures of compliance, enforcement, and the other explanatory variables used in this study. A variety of explanatory variables were included in the analysis such as individual, firm-level, contractual, and spatial characteristics. The individual characteristics included were race, gender, education, and age.

TABLE 1: Summary Statistics

| | VARIABLE | MEAN | STD. DEV. |
|------------|-------------------|--------|-----------|
| INDIVIDUAL | V0 | 0.4402 | 0.4964 |
| | V1 | 0.3503 | 0.2330 |
| | White | 0.0595 | 0.2366 |
| | Coloured | 0.1207 | 0.3258 |
| | Asian | 0.0201 | 0.1403 |
| | Female | 0.4991 | 0.5000 |
| | English | 0.0614 | 0.2401 |
| | None to Grade 8 | 6.6672 | 2.4441 |
| | Grade 9-11 | 1.4892 | 1.3764 |
| | Grade 12 | 0.2881 | 0.4529 |
| | Diploma | 0.0450 | 0.2074 |
| | Degree | 0.0136 | 0.1645 |
| | 25-34 years | 0.3687 | 0.4824 |
| | 35-44 years | 0.2487 | 0.4323 |
| | 45-54 years | 0.1806 | 0.3847 |
| | 55-65 years | 0.0789 | 0.2696 |
| | Kaitz ratio | 1.1577 | 0.6331 |
| SECTORAL | Farm | 0.1559 | 0.3628 |
| | Retail | 0.1644 | 0.3706 |
| | Forestry | 0.0151 | 0.1219 |
| | Taxi | 0.0401 | 0.1962 |
| | Security | 0.0967 | 0.2956 |
| | Hospitality | 0.0780 | 0.2682 |
| | Contract Cleaning | 0.1180 | 0.3226 |
| | Civil Engineering | 0.0042 | 0.0648 |

4 This seems low compared to countries such as Uruguay (67) and Panama (69), but is larger than the size of the inspectorate per million workers in Argentina (22), Mexico (6), Columbia (15), and Brazil (34) (Ronconi, 2010).

| | | | |
|-------------------------|--------------------------------------|----------|-----------|
| FIRM-LEVEL/CONTRACTUAL | Small firm | 0.2525 | 0.4345 |
| | Medium firm | 0.1542 | 0.3611 |
| | Medium-Large firm | 0.1611 | 0.3677 |
| | Union member | 0.1857 | 0.3889 |
| | Written contract | 0.6025 | 0.4894 |
| | Permanent contract | 0.6422 | 0.4793 |
| | Tenure | 5.3793 | 6.9852 |
| | Formal sector | 0.5703 | 0.4950 |
| | Semi-formal | 0.6467 | 0.4780 |
| | Public sector | 0.0553 | 0.2285 |
| SPATIAL/ ENFORCEMENT | Area A | 0.7303 | 0.4438 |
| | Labour force per mile ² | 946.7942 | 1146.0110 |
| | Local unemployment rate | 0.3426 | 0.1045 |
| | Provincial budget(100,000s) | 616.9416 | 248.7654 |
| | Labour centres per mile ² | 0.0013 | 0.0016 |
| | Inspectors per 100,000 | 1.551478 | 0.71132 |
| | Non- Inspectors per 100,000 | 3.684079 | 0.926782 |

SOURCE: Own calculations using LFS September 2007, StatsSA.

NOTES: 1. Only workers covered by the Department of Labour (DoL) sectoral determinations were included in the sample. The self-employed were not included in the sample since they pay their own wages.
2. Small firms are those with less than 9 employees, medium firms are those with less than 19 employees, medium-large firms refers to enterprises with less than 50 employees, and large firms are those with 50 employees or more. Estimates shown are for the weighted sample.
3. The Kaitz index of a worker is estimated as the ratio of their applicable minimum to the median wage in their sector-occupation-location category. The mean value of the Kaitz index in the table is the mean of all the sector-occupation-location adjusted Kaitz ratios of the workers in the sample.

Another measure of relevance in the compliance literature is the Kaitz index, which provides a measure of the rigidity or ‘toughness’ of the minimum wage set (Andalón and Pagés, 2008). A notable result from this study is that although minimum wages in Kenya are set high relative to the median wage, non-compliance levels in the country are also high. Interestingly enough, sectors and occupations with a high Kaitz index are also found to have a higher percentage of non-compliance and vice versa (Andalón and Pagés, 2008). Certainly then, the ratio of the minimum wage to the median is an interesting measure to consider when investigating the possible determinants of non-compliance or violation⁵.

As discussed above, results show that the level and depth of violation in South Africa may differ across sectors, we included a range of controls capturing the sector of employment of the covered worker.

A variety of control variables surrounding firm-level, contractual, and other employment characteristics were also included in the analysis. We attempted to control for the degree of formality of a firm. Formal firms were defined as those who were reported as both registered and paid VAT, semi-formal firms as those that met one of these two criteria, whilst informal firms were defined as those that were neither reported as registered nor as paying VAT. The duration of employment, as measured by the tenure variable⁶ was also included as a

5 The Kaitz ratio is estimated as the ratio of the mean minimum wage relative to the median wage in each sector-occupation-location group.

6 The tenure variable was derived using information in the Labour Force Survey on the year the individual started working with the current employer. The variable was estimated as the log of the number of years of employment with the present employer.

potential determinant of violation. In addition, we included controls for a written contract, permanent contract, and union membership.

An interesting innovation in this paper is to provide a set of spatial variables to proxy for the probability of an employer being 'enforced' upon. The key measure of enforcement is the number of labour inspectors per 100,000 persons. Two additional measures of enforcement were constructed, namely the number of labour centres per square mile, and the budget (in South African Rands) of the DoL labour offices by province, normalised by 100,000. Spatial controls were also included to account for local labour market characteristics, specifically the number of broad labour force participants per square mile, and the unemployment rate in the district council. Additionally, a dummy variable was constructed for workers in areas classified as 'A' type areas. These areas listed under this category are generally non-rural and may differ across sectoral determinations⁷.

The following section outlines the data and econometric approach to be used in the investigation of the various determinants of violation in the South African labour market, in an attempt to isolate their simultaneous impact on violation.

4. DATA AND ECONOMETRIC APPROACH

The dataset used was the September edition of the 2007 Labour Force Survey (LFS) conducted by Statistics South Africa (StatsSA)⁸. This is the most recent available dataset containing income information for South Africa⁹.

For the analysis of the determinants of individual violation, we first use a probit model to investigate the determinants of the probability of an individual being violated, or in other words, receiving a wage below the stipulated minimum. The probit model is used to determine whether these factors do indeed change the likelihood of an individual being paid a wage below the minimum, as well as to quantify the marginal effects of the variables. Here, the dependent variable, V_o , is a categorical variable, taking on a value of 1 if the individual's wage is below their respective minimum or 0 if their wage is at or above the minimum. The violation probit is estimated for the full sample of employed individuals (excluding the self-employed since they pay their own wages) who are covered by the DoL sectoral determinations. The equation we wish to estimate takes on the following form:

$$Pr(V_o = 1 | X = x) = \Phi(x'\beta) \text{ where } 0 \leq P(V) \leq 1$$

where V is the binary dependent variable V_o equal to 1 for violated individuals earning wages below the statutory minimum and 0 for their non-violated counterparts, X is a vector of explanatory variables, β are the parameters to be estimated, and Φ is the standard normal cumulative distribution function.

Next, for the reduced sample of violated individuals ($V_o = 1$) only, the determinants of the depth of violation (as measured by V_l) are estimated by means of OLS regression. Hence V_l was estimated for each individual and used as the dependent variable in the regression¹⁰. All non-categorical variables were logged. The OLS equation for the depth of violation V_l takes on the following form:

$$V_{lik} = \alpha + \beta E_{ik} + \gamma X_i + \delta Z_{ik} + \varepsilon_{ik}$$

where V_{lik} refers to the depth of violation V_l for the worker i in sector j and location k (the dependent variable), is a vector of enforcement measures for individual i in location k (number of inspectors per 100,000

7 The reader is referred to Bhorat, Kanbur, and Mayet, 2010b for a more detailed account of the methodology used in mapping workers in the Labour Force Survey to the different area types.

8 This is a nationally representative survey conducted bi-annually using a rotating panel of households. The survey is designed as a stratified sample and uses weights based on the 2001 census. Both rural and urban areas are included.

9 For a detailed discussion of the dataset used as well as the construction of variables, the reader is referred to Bhorat, Kanbur, and Mayet, 2010b.

10 V_l was measured as the individual wage gap using the following formula: $(w^M - w_i)/w^M$ where w^M is the minimum wage for the individual and w_i is the individual's wage.

persons, labour centres per square mile, and DoL budget), β being the key parameter of interest, measuring the effect of enforcement on compliance, X_i are demographic, sectoral, and employment characteristics of the individual i , and Z_{ik} are additional spatial controls. The disturbance term and the constant are captured by ε_{ik} and α respectively. We assume ε_{ik} is an i.i.d. error term. Since workers in the same district council have the same spatial and enforcement measures¹¹, we cluster the standard errors at the district council level to control for the potential presence of an unobserved effect on the error term.

DEALING WITH ENDOGENEITY

One of the problems when attempting to investigate the effect of enforcement on compliance is the possibility of the reverse causal effect of compliance on enforcement. On the one hand, one would expect enforcement to increase compliance since a firm's propensity to violate may be inversely related to the probability of getting caught and/or penalized. On the other hand, low compliance may result in the government agency increasing the resources allocated to enforcement, such as the number of labour inspectors. Therefore, E_{ik} is potentially correlated with ε_{ik} . In this case, OLS would become inconsistent.

One strategy to deal with this problem is to find an instrumental variable for the number of labour inspectors. We propose here the number of non-inspectors as an instrument. These are DoL employees employed at labour centres; however, they do not form part of the inspectorate¹². Hence, we would expect the number of non-inspectors to be a strong predictor of changes in the size of the inspectorate, but unrelated to compliance with minimum wages¹³. Given that the number of non-inspectors would not be expected to be correlated with the index of violation¹⁴, we use the number of non-inspectors per capita as an instrumental variable¹⁵. However, it is important to account for factors that may affect the number of non-inspectors as well as violation, and for this purpose, the provincial budget of the DoL was included as a control.

Table 2 presents the results of a first-stage regression of the number of inspectors per 100,000 persons on the number of non-inspectors in labour centres (the instrumental variable), and including various controls. The results across the specifications show that the instrumental variable is a good predictor of the number of labour inspectors. Having found an appropriate instrument, we now analyse the results from the multivariate analysis of the determinants of violation below.

11 There are 53 district councils in South Africa, which are contained in 9 provinces. Spatial information was available at the district council level. Therefore, workers in the same district councils have the same enforcement and spatial characteristics. See Bhorat, Kanbur, and Mayet (2010b) for a detailed description of the mapping of workers and their minima to district councils in the LFS.

12 Labour centres in South Africa consist of a Client Services division, which deals with cases such as those pertaining to Unemployment Insurance, Career Services, and the Compensation Fund. Complainants file their cases at the Client Services helpdesk.

13 The approach followed is similar to that used by Levitt (2002), who uses the number of municipal fire-fighters as an instrument for police officers in order to estimate the effects of police on crime.

14 The key assumption here is that the number of non inspectors in a labour centre does not affect the productivity of labour inspectors. However, given that the non-inspectors are located in the Client Services division of the labour centres, we would not expect them to impact on the productivity of the inspectorate.

15 The numbers of non-inspectors in labour offices by province, as well as the Department of Labour budgetary allocations per province were obtained from the Department of Labour of South Africa.

TABLE 2: The number of non-inspectors as a predictor of the number of labour inspectors

| DEPENDENT VARIABLE INSPECTORS PER CAPITA (LOGGED) | I | II | III |
|---|---------|---------|---------|
| NON-INSPECTORS PER CAPITA (LOGGED) | 2.228* | 1.228** | 1.751* |
| | (0.548) | (0.242) | (0.357) |
| INDIVIDUAL CONTROLS INCLUDED | No | Yes | Yes |
| SECTORAL CONTROLS INCLUDED | No | Yes | Yes |
| FIRM LEVEL/CONTRACTUAL CONTROLS INCLUDED | No | Yes | Yes |
| SPATIAL CONTROLS INCLUDED | No | Yes | Yes |
| ENFORCEMENT CONTROLS INCLUDED | No | Yes | No |
| OBSERVATIONS | 9,221 | 6,923 | 6,923 |
| R-SQUARED | 0.453 | 0.741 | 0.580 |
| ADJUSTED F-STATISTIC | 16.52 | 25.72 | 29.01 |
| PROB>F | 0.0002 | 0.0000 | 0.0000 |

SOURCE: Results using Labour Force Survey September 2007 (Statistics South Africa) and data provided by the Department of Labour on the labour inspectorate and provincial budget.

NOTES: * significant at 10%; ** significant at 5%; *** significant at 1%. The table reports the least squares estimates of a regression of the log of the number of labour inspectors per 100,000 people in a province on the log of the number of non-inspectors per 100,000, and individual, sectoral, firm-level, and spatial controls. Robust standard errors controlling for clustering at the district council level are shown in parentheses. The F-statistic tests the hypothesis that the non-inspectors coefficient is zero and is adjusted to allow for heteroskedasticity and clustering by province. Results are for the weighted sample of covered, non-self-employed individuals only.

For the covariates which are dummy variables, the following are the referent variables:

RACE: African

AGE: 16-24 years

AREA TYPE A: other area type (B, C, D, or E)

SECTORAL DETERMINATION: Domestic workers

UNION STATUS: Non-union member

FIRM SIZE: Large firms (more than 50 employees)

CONTRACT: Non-written; non-permanent

SECTOR: Informal; non-public.

5. RESULTS

Table 3 presents the results (marginal effects) from a probit model investigating the determinants of individual violation (V_o). Three specifications are included, the first being a probit, whilst specifications II and III treat the inspector variable as endogenous, using an instrumental variable probit model. Specification II includes only one enforcement regressor, namely the inspector variable (instrumented by the number of non-inspectors), which is the key measure of enforcement of interest here, as an attempt to investigate its effect on compliance

when the other enforcement measures are excluded¹⁶. Specification III is the preferred specification, since it includes the full set of individual, sectoral, firm-level, spatial and enforcement controls, as well as controlling for the endogeneity of the inspectors variable by instrumenting using the number of non-inspectors.

TABLE 3: Results from violation probit

| DEPENDENT VARIABLE = V_0 MARGINAL EFFECT | | I (PROBIT) | | II (IV PROBIT) | | III (IV PROBIT) | |
|---|-------------------|-----------------|------------|-----------------|------------|-----------------|------------|
| | | MARGINAL EFFECT | STD. ERROR | MARGINAL EFFECT | STD. ERROR | MARGINAL EFFECT | STD. ERROR |
| INDIVIDUAL | White | -0.348*** | 0.0238 | -0.348*** | 0.0247 | -0.347*** | 0.0257 |
| | Coloured | -0.0952*** | 0.0309 | -0.0801*** | 0.0304 | -0.0727** | 0.0311 |
| | Asian | -0.125* | 0.0692 | -0.134* | 0.0703 | -0.135* | 0.0704 |
| | Female | 0.141*** | 0.0311 | 0.139*** | 0.0318 | 0.138*** | 0.0317 |
| | English | -0.202*** | 0.0362 | -0.204*** | 0.0331 | -0.209*** | 0.0339 |
| | None to Grade 8 | -0.0196*** | 0.0056 | -0.0193*** | 0.00573 | -0.0190*** | 0.00569 |
| | Grade 9-11 | -0.00562 | 0.0222 | -0.00593 | 0.0221 | -0.00593 | 0.0221 |
| | Grade 12 | -0.0879* | 0.0465 | -0.0865* | 0.0464 | -0.0861* | 0.0463 |
| | Diploma | -0.157*** | 0.0459 | -0.158*** | 0.0461 | -0.162*** | 0.0454 |
| | Degree | -0.109 | 0.0684 | -0.108 | 0.0672 | -0.105 | 0.0677 |
| | 25-34 years | 0.0235 | 0.0441 | 0.0261 | 0.0437 | 0.0261 | 0.0439 |
| | 35-44 years | -0.0617 | 0.0615 | -0.0572 | 0.0622 | -0.0579 | 0.0623 |
| | 45-54 years | -0.0995 | 0.0726 | -0.0937 | 0.0734 | -0.0934 | 0.074 |
| | 55-65 years | -0.008 | 0.0861 | 0.0002 | 0.0859 | -0.0002 | 0.0865 |
| | Kaitz ratio | 0.540*** | 0.0365 | 0.541*** | 0.0379 | 0.538*** | 0.0387 |
| SECTORAL | Farm | 0.132*** | 0.0499 | 0.128** | 0.0505 | 0.127** | 0.05 |
| | Retail | -0.221*** | 0.0467 | -0.220*** | 0.0488 | -0.217*** | 0.0496 |
| | Forestry | 0.176** | 0.0714 | 0.155** | 0.072 | 0.151** | 0.0722 |
| | Taxi | -0.126** | 0.0509 | -0.127** | 0.0505 | -0.125** | 0.0513 |
| | Security | 0.0792 | 0.0646 | 0.0763 | 0.065 | 0.0767 | 0.065 |
| | Hospitality | -0.156*** | 0.0386 | -0.154*** | 0.0397 | -0.154*** | 0.0388 |
| | Contract Cleaning | -0.0372 | 0.059 | -0.0349 | 0.0586 | -0.0343 | 0.0589 |
| | Civil Engineering | -0.236** | 0.0965 | -0.242*** | 0.0929 | -0.232** | 0.0987 |
| FIRM-LEVEL/CONTRACTUAL | Small firm | 0.0674* | 0.0371 | 0.0675* | 0.0374 | 0.0672* | 0.0369 |
| | Medium firm | 0.160** | 0.064 | 0.157** | 0.064 | 0.157** | 0.0639 |
| | Medium-Large | 0.0356 | 0.0436 | 0.0323 | 0.0427 | 0.0311 | 0.0425 |
| | Union member | -0.114*** | 0.038 | -0.112*** | 0.0373 | -0.114*** | 0.0371 |
| | Written | -0.143*** | 0.0372 | -0.142*** | 0.0366 | -0.145*** | 0.0373 |
| | Permanent | -0.0785** | 0.0356 | -0.0778** | 0.0352 | -0.0765** | 0.0364 |
| | Tenure | -0.0465*** | 0.0143 | -0.0473*** | 0.0138 | -0.0474*** | 0.0138 |
| | Formal sector | -0.014 | 0.0505 | -0.0124 | 0.0504 | -0.0107 | 0.0505 |
| | Semi-formal | -0.0465 | 0.0416 | -0.0496 | 0.0423 | -0.0501 | 0.0423 |
| | Public sector | -0.188*** | 0.0406 | -0.190*** | 0.0398 | -0.187*** | 0.0398 |

16 To control for the possible multicollinearity of the three enforcement regressors included, we ran separate models with each regressor. However, the results of the model were unchanged.

| | | | | | | | |
|--------------------------|--------------------------------|------------|---------|------------|---------|------------|---------|
| SPATIAL / ENFORCEMENT | Area A | -0.0129 | 0.0378 | -0.0127 | 0.0328 | -7.13E-05 | 0.0419 |
| | Labour force/mil ² | -0.0221*** | 0.00721 | -0.0300*** | 0.00821 | -0.0253*** | 0.00861 |
| | Unemployment rate | 0.193*** | 0.049 | 0.153** | 0.0631 | 0.129** | 0.0625 |
| | Inspectors/100,000 | 0.015 | 0.0313 | -0.0258 | 0.0325 | -0.0551 | 0.0472 |
| | Provincial Budget | 0.014 | 0.1210 | ... | ... | -0.13 | 0.1350 |
| | Labour centre/mil ² | -0.0175 | 0.0379 | ... | ... | 0.0281 | 0.0427 |
| | Observations | 6,923 | | 6,923 | | 6,923 | |
| | Predicted probability | 0.3602 | | 0.3603 | | 0.3606 | |

SOURCE: Own calculations using LFS September 2007, Statistics South Africa.

NOTES: 1. Marginal effects reported. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors used after adjusting for clustering at the district council level.
 2. The number of labour inspectors per 100,000 people is instrumented by the number of non-inspectors per 10,000 people in Specifications II and III.
 3. All non-categorical variables were logged.

A preliminary analysis of the results in Table 3 suggests that there are a wide range of variables impacting on the probability of violation, such as individual, sectoral, enterprise, contractual and spatial characteristics. However, the results show that the three enforcement measures included in the analysis, namely the number of inspectors per 100,000, DoL budget, and the number of labour centres per square mile, are not significant in determining the probability of violation.

The individual characteristics included in the three specifications were race, gender, speaking English as a home language, education and age. From the results, it is clear that both race and gender are significant determinants of whether or not an individual is paid a wage below his/her legislated minima. The race dummy variables for Whites, Coloureds, and Asians yield significant and negative coefficients, suggesting that these population groups have a lower probability of being violated than their African counterparts, whilst controlling for sectoral, enterprise, spatial and enforcement characteristics. The coefficient for the dummy variable for females was positive and significant at the 1% level in all specifications, suggesting that female workers are more likely to be violated than males.

The dummy variable for speaking English as a home language was negative and significant at the 1% level in all specifications, suggesting that individuals who speak English as a home language are less likely to be paid wages that fall below the stipulated minima.

The results from the educational splines suggest that better educated individuals are less likely to be violated. The negative and significant coefficient on the Grade 12 spline suggests that completion of a Matric qualification reduces the probability of violation. The negative and statistically significant coefficient on the Diploma variable suggests that the completion of a Diploma qualification as opposed to a Grade 12 qualification or lower reduces the likelihood of an individual being violated. The coefficient for the Degree variable is not significant, implying employees who possess a Degree qualification from a university are not less/more likely to be violated than their counterparts possessing a Diploma from a non-university higher education institution.

The coefficients for the age variables are not statistically significant, suggesting that age does not play a significant role in influencing the probability of violation.

A variable of particular interest here is the Kaitz index, which yields a positive and significant result. This implies that workers whose minimum is set at a higher level relative to the median wage in their sector-occupation-location group have a greater likelihood of violation. These results are robust to all specifications.

The coefficients for the sectoral dummies suggest that the sector of employment play an important role in determining the likelihood of violation. Barring the Security and Contract Cleaning sectors, all sectors yield significant results. Workers employed in the Retail, Taxi, Hospitality, and Civil Engineering sectors all had a lower probability of violation than Domestic workers. This result is as expected, given that Domestic workers

are traditionally amongst the most vulnerable workers in the South African economy. Farm workers are another historically vulnerable sector in South Africa, and the results indicate that Farm workers have a higher probability of being violated relative to Domestic workers.

The third set of key variables featured in this analysis was a range of enterprise and contractual characteristics capturing the nature of employment. The results show that the size of an enterprise¹⁷ is a key predictor of the probability of individual violation¹⁸. In all specifications, the results for small (less than 10 employees) and medium-sized firms (10 to 19 employees) are positive and statistically significant, suggesting that employees in these firms are more likely to be violated than employees in larger enterprises. In other words, this result implies that employers in larger firms are more likely to be enforced upon. Or rather, given their visibility, employers in large enterprises are less likely to want to engage in practices which violate the minimum wage. Another possibility is that large firms are more likely to be unionised than smaller firms: The union dummy coefficient, as expected, was negative and statistically significant in all specifications, suggesting that union workers are less likely to be violated by employers than their counterparts who are not part of a union. The key result here, however, is that large firms are less likely to fail to comply even when controlling for worker unionization.

The formal and semi-formal coefficients were not found to be statistically significant. On the other hand, whilst the degree of formality of a firm does not seem to impact on whether or not employees are paid sub-minimum wages, whether a firm is located in the public sector or the private sector is a key determinant. Individuals employed in public sector firms or in State owned enterprises (SOEs) were significantly less likely to be violated than those employed in the non-public sector, as evidenced by the negative and significant coefficient for the public sector dummy variable¹⁹.

The type of contract is also a significant predictor of the probability of violation. In all specifications, the dummy variable for a written contract yields a negative and statistically significant result. Employees with a written contract are less likely to be violated than those with no contract or an informal contract²⁰. The dummy variable for a permanent employment contract was also negative and significant in all specifications, suggesting that workers possessing a permanent contract have a lower likelihood of being violated relative to those engaged in non-permanent forms of employment. The tenure variable is also shown to be a significant predictor of the probability of being violated. The coefficient on the tenure variable was significant and negative in all specifications, indicating that a longer tenure is associated with a significantly lower probability of being violated.

Somewhat contrary to what one would expect, given the literature on the relationship between enforcement and compliance, is that our results for the three enforcement variables included are insignificant, including the result for the inspector variable. The three enforcement measures, namely the number of labour inspectors per 100,000 persons, labour centres per square mile, and the provincial budget of the DoL, yield insignificant results across all specifications. In the second specification, the labour inspector variable was included as the sole measure of enforcement, to control for the possible multicollinearity between the different enforcement measures. However, the result remains insignificant. The absence of a significant result for the inspector variable must however be interpreted with caution, given the limitations noted earlier of the data available to measure enforcement in this study.

The results for the spatial variables on the other hand, suggest that local labour market dynamics may play a role in determining compliance. The variable denoting 'A' type areas was not found to be statistically significant

17 Small firms are those with up to 9 employees, medium firms are those with 10 to 19 employees, medium-large firms refers to enterprises with 20 to 50 employees, and large firms are those with over 50 employees.

18 There is a possibility that firm size may be endogenous to enforcement. We re-estimated the model excluding any firm-size regressors, with no material change in the overall results.

19 Interviews with labour inspectors indicate that in South Africa, both public and private sector firms are inspected.

20 There is a possibility that the contract variable is endogenous to enforcement. We re-estimated the model without the contract variable, with no change in the results.

in any of the specifications at the 10% level, suggesting that living in an area classified as an 'A' area as opposed to a less urban area does not significantly alter the probability of a wage earner being violated. On the other hand, labour density, as captured by the log of the number of labour participants per square mile, is negatively associated with the probability of violation of an individual. The local unemployment rate was also significant in all specifications. The coefficient for the unemployment rate was positive and significant at the 1% level, indicating that a higher unemployment rate results in a larger probability of violation. This finding is consistent with that of Ronconi (2010), who found unemployment to be positively correlated with noncompliance in Argentina. This result can be understood if we think of a larger number of unemployed in an area as resulting in a higher probability of workers willing to work for sub-minimum wages, and in turn leading to a higher likelihood that employers will violate the statutory minima, knowing that surplus labour will be supplied at these sub-minimum rates. Overall then, the results suggest that local labour market dynamics in South Africa play a significant role in determining individual violation.

Having investigated the determinants of the probability of individual violation, we now turn to an analysis of the factors that influence the depth of this violation, as measured by the V_1 violation index. Table 4 shows the results from the OLS and 2SLS of the effect of enforcement (instrumented by non-inspectors per 100,000 persons) on V_1 . The first specification is an OLS regression including the full set of individual, firm-level, sectoral, and spatial controls. In specifications II and III the labour inspector variable is treated as endogenous, and is instrumented using the number of non-inspectors. Specification II includes only the inspector variable as the enforcement measure, whilst specification III includes the two additional enforcement controls in this study, specifically the DoL labour budget and the number of labour centres per square mile. Once again, the third specification is the preferred specification, since it controls for the endogeneity of the inspector variable and including the full set of relevant enforcement controls.

TABLE 4: OLS and 2SLS estimates from regression on V_1

| DEPENDENT VARIABLE= V_1 (LOGGED) | | I(OLS) | | II(2SLS) | | III(2SLS) | |
|------------------------------------|-------------------|-------------|------------|-------------|------------|-------------|------------|
| | | COEFFICIENT | STD. ERROR | COEFFICIENT | STD. ERROR | COEFFICIENT | STD. ERROR |
| INDIVIDUAL | White | -0.3280 | 0.3620 | -0.332 | 0.3530 | -0.328 | 0.3600 |
| | Coloured | -0.0661 | 0.2070 | -0.0723 | 0.1980 | -0.0593 | 0.2310 |
| | Asian | 0.2990 | 0.2410 | 0.293 | 0.2310 | 0.294 | 0.2310 |
| | Female | -0.0093 | 0.0781 | -0.00976 | 0.0776 | -0.0103 | 0.0776 |
| | English | -0.3090 | 0.2180 | -0.312 | 0.2230 | -0.312 | 0.2250 |
| | None to Grade 8 | -0.0114 | 0.0152 | -0.0116 | 0.0154 | -0.0114 | 0.0152 |
| | Grade 9-11 | -0.134*** | 0.0384 | -0.134*** | 0.0381 | -0.134*** | 0.0382 |
| | Grade 12 | 0.229** | 0.1030 | 0.228** | 0.1030 | 0.229** | 0.1040 |
| | Diploma | -0.623 | 0.3730 | -0.624 | 0.3740 | -0.621 | 0.3720 |
| | Degree | 0.1120 | 0.3280 | 0.1100 | 0.3260 | 0.1160 | 0.3310 |
| | 25-34 years | -0.296*** | 0.0819 | -0.297*** | 0.0814 | -0.296*** | 0.0824 |
| | 35-44 years | -0.136 | 0.1010 | -0.136 | 0.1030 | -0.136 | 0.1020 |
| | 45-54 years | -0.0475 | 0.0805 | -0.0469 | 0.0793 | -0.0454 | 0.0788 |
| | 55-65 years | -0.00849 | 0.1170 | -0.00824 | 0.1190 | -0.00689 | 0.1200 |
| | Kaitz ratio | 0.696*** | 0.1150 | 0.698*** | 0.1150 | 0.697*** | 0.1150 |
| SECTORAL | Farm | 0.0566 | 0.1130 | 0.0562 | 0.1130 | 0.0557 | 0.1130 |
| | Retail | -0.137 | 0.1130 | -0.139 | 0.1150 | -0.138 | 0.1130 |
| | Forestry | -0.0967 | 0.1910 | -0.0994 | 0.1970 | -0.102 | 0.2010 |
| | Taxi | 0.00981 | 0.1550 | 0.00942 | 0.1540 | 0.00986 | 0.1550 |
| | Security | 0.247 | 0.1880 | 0.242 | 0.1920 | 0.245 | 0.1890 |
| | Hospitality | 0.124 | 0.1190 | 0.123 | 0.1190 | 0.125 | 0.1190 |
| | Contract Cleaning | 0.215 | 0.2570 | 0.215 | 0.2570 | 0.216 | 0.2580 |
| | Civil Engineering | 0.930** | 0.4320 | 0.934** | 0.4350 | 0.920** | 0.4430 |

| | | | | | | | |
|--------------------------|--------------------------------------|-----------|--------|-----------|--------|-----------|--------|
| FIRM-LEVEL / CONTRACTUAL | Small firm | 0.0788 | 0.0610 | 0.0791 | 0.0617 | 0.079 | 0.0610 |
| | Medium firm | 0.0691 | 0.1140 | 0.0688 | 0.1150 | 0.0689 | 0.1150 |
| | Medium-Large firm | -0.00938 | 0.0727 | -0.0121 | 0.0733 | -0.0117 | 0.0723 |
| | Union member | -0.0655 | 0.1020 | -0.0644 | 0.1040 | -0.0654 | 0.1030 |
| | Written contract | -0.137 | 0.0849 | -0.136 | 0.0893 | -0.137 | 0.0849 |
| | Permanent contract | -0.205*** | 0.0757 | -0.204*** | 0.0757 | -0.204*** | 0.0752 |
| | Tenure | -0.120*** | 0.0261 | -0.121*** | 0.0260 | -0.121*** | 0.0263 |
| | Formal sector | -0.168*** | 0.0517 | -0.168*** | 0.0502 | -0.168*** | 0.0518 |
| | Semi-formal | -0.155** | 0.0748 | -0.156** | 0.0763 | -0.156** | 0.0768 |
| | Public sector | -0.0757 | 0.2330 | -0.0758 | 0.2340 | -0.0761 | 0.2330 |
| SPATIAL / ENFORCEMENT | Area A | -0.150** | 0.0606 | -0.149** | 0.0678 | -0.146** | 0.0727 |
| | Labour force per mile ² | -0.00916 | 0.0262 | -0.0102 | 0.0304 | -0.0107 | 0.0328 |
| | Local unemployment rate | 0.559*** | 0.1480 | 0.538** | 0.2440 | 0.544** | 0.2200 |
| | Inspectors per 100,000 | 0.0531 | 0.0542 | 0.0425 | 0.1240 | 0.0338 | 0.1810 |
| | Provincial Budget | -0.0114 | 0.1510 | ... | ... | -0.0499 | 0.3510 |
| | Labour centres per mile ² | 0.00669 | 0.0527 | ... | ... | 0.0196 | 0.1260 |
| CONSTANT | | 0.17 | 0.1700 | 1.2690 | 0.0338 | 0.1960 | 0.5030 |
| OBSERVATIONS | | 2,945 | | 2,945 | | 2,945 | |
| R ² | | 0.18 | | 0.1799 | | 0.1799 | |
| F-TEST | | 143.63 | | 69.15 | | 85.32 | |

SOURCE: Own calculations using LFS September 2007, StatsSA.

NOTES: 1. Marginal effects reported. *** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$. Robust standard errors used after adjusting for clustering at the district council level.

2. The number of labour inspectors per 100,000 people is instrumented by the number of non-inspectors per 100,000 people in Specifications II and III.

4. The dependent variable, V_1 , was logged, as well as non-categorical right-hand side variables. The coefficients for the logged independent variables are therefore interpreted as elasticities.

From the results in Table 4, we note that although demographic characteristics were important in determining the probability of violation, they do not seem to be important in predicting the depth of violation. The coefficients for the race variables and gender were statistically insignificant in all the specifications where they were included. The results therefore suggest that while race and gender play a significant role in determining whether an individual is violated or not, they are irrelevant in determining the extent of this violation, as measured by V_1 . The English as a home language dummy variable also yields an insignificant result, suggesting that whilst native speakers of English may experience a lower likelihood of violation, for violated individuals, home language does not appear to have a significant effect on the size of violation.

The results for the educational splines are generally insignificant, barring the results for the Grade 9 to 11 and the Grade 12 spline. The former is negative, implying that for violated individuals who have completed between Grades 9 and 11, an additional year of schooling can reduce the depth of violation by about 13.4%. The result for the Grade 12 spline is positive and significant at the 5% level. This would seem to suggest that whilst completion of a Matric qualification may yield a reduced likelihood of violation, for those individuals who are paid below their respective minimum, a Matric qualification is associated with an increase in the depth of violation. The results for the remaining educational splines were not statistically significant.

The coefficients for the age groups indicate that there is a youth bias among violating employers. Individuals in the 25-34 years category experience a lower depth of violation than individuals aged between 15 and 24, as evidenced by the negative and significant coefficient. Individuals aged between 25 and 34 years experience a depth of violation of around 30% lower than their younger counterparts. The remaining age categories do not yield statistically significant results.

The level of an individual's minimum relative to the median wage in the labour market, as measured by the Kaitz index (logged), was negative and significant in all four specifications. This result shows that setting a minimum wage that is too high relative to the median not only increases the likelihood of violation, but also results in a larger depth of violation. A 1% increase in the Kaitz ratio is associated with an increase in the depth of violation of the individual of about 0.7%.

The results for the sectoral dummies were not significant in all four specifications, with the exception of the Civil Engineering sector. Hence, whilst most sectors were less likely to be violated than Domestic workers, violated individuals in other sectors seem to be no worse relative to Domestic workers. On the other hand, whereas Civil Engineers are less likely to be violated than Domestic workers, the depth of violation of these individuals is significantly larger. For individuals in the Civil Engineering sector who are earning below the minimum, the depth of violation increases by between 92 and 93%²¹. This result shows the importance of a violation measure capturing both whether or not an individual is violated, as well as the size of their respective violation, which allows us to investigate the differences in the factors impacting on both the probability of being violated as well as the depth of violation.

Since the coefficient on the union membership categorical variable is not significant, we conclude that union membership does not significantly impact on the depth of violation. Examining the contractual variables, we observe that whilst a written contract is not significant in determining the depth of violation, the possession of a permanent contract is. The coefficient for permanent contract is negative and significant in all specifications and suggests that permanent contract holders who are violated have a depth of violation about 20% lower than individuals with temporary or other non-permanent contract types. The coefficient of the tenure variable is also significant and negative in all specifications. A 1% increase in tenure may reduce the depth of violation by around 12%.

While individuals employed in formal firms were found as likely to be violated as their informal counterparts, formal and semi-formal types of employment are associated with a significantly smaller depth of violation. In all specifications, the coefficients for firms in the formal sector were negative and statistically significant, and suggest that employment in a formal firm may decrease an individual's depth of violation by nearly 17%. Semi-formal employment is associated with a reduction in the depth of violation of nearly 16%.

The size of an enterprise, which was found to be a significant determinant of the probability of being violated, was not found to have a significant impact on the depth of violation. The public sector variable was also not found to be statistically significant in influencing the depth of violation of an individual.

We now turn to the last set of covariates, that is, the spatial variables. The coefficient for the Area A (urban) dummy variable, which was not relevant in determining the likelihood of violation, has a significant impact in determining the depth of violation. The Area A dummy therefore suggests that workers in A type areas experience a depth of violation of around 12 to 13% smaller than those in other areas. This may be a reflection of the fact that A type areas may be less remote than more rural areas, and hence may be more easily accessed by labour inspectors and enforced upon. The local unemployment rate has the effect of significantly increasing the severity of violation. A 1% increase in the local unemployment rate is associated with an increase in the depth of violation by as much as 0.56%. Hence, violated workers in district councils with high rates of unemployment are worse off than those in areas with low unemployment rates. The remaining spatial controls, namely labour participants per square mile, provincial budget, and labour centres per square mile, were not found to significantly impact on the depth of violation.

Collectively then, the results above suggest that there are a range of variables impacting on the depth of violation of an individual, including individual characteristics such as education and age, as well as employment and spatial characteristics. However, it seems that there are two categories of variables driving the depth of violation, V_1 . On the one hand, firm-level and contractual factors seem to play an important role, notably the term of contract, the length of tenure, and the formality of the firm. On the other hand, local labour market characteristics, notably the unemployment rate, play a key role. The key results though remain the lack of significance of the enforcement variables, namely the labour inspectorate deployed, DoL budget, and labour offices per square mile, on the level and depth of violation, as well as the significance of the local unemployment rate and the ratio of the minimum wage to the median (Kaitz ratio).

21 This finding is consistent with the results of Bhorat, Kanbur, and Mayet (2010b), who showed that whilst the Civil Engineering sector recorded the lowest V_0 measure in 2007, the depth of violation in this sector, as measured by the V_1 index, was the largest.

6. CONCLUSION

This paper constitutes an early attempt to estimate the causal effect of government enforcement on compliance with minimum wages in South Africa. Both the determinants of the likelihood of an individual being violated, as well as the determinants of the depth of violation are analysed. The results show that there are a variety of factors impacting on the probability and depth of violation, including individual, sectoral, firm-level/contractual, and spatial characteristics. Whilst individual characteristics such as race and gender were significant markers of whether an employee was violated or not, they were shown to be insignificant in determining the depth of violation. Preliminary evidence presented here also suggests a positive correlation between the Kaitz ratio (the ratio of the minimum wage to the median) and the level and depth of violation. The results also suggest that the local unemployment rate is significant in determining both the level and depth of violation. This may be indicative of the extent to which local labour market dynamics can influence compliance with minimum wage laws. Surprisingly, the enforcement variables, namely the number of labour inspectors, labour centres per square mile, and DoL budget allocation, were not found to significantly impact on compliance.

The analysis and assessment of the determinants of minimum wage compliance in South Africa is just beginning. This paper represents a first step, and we hope it will provide the basis for more detailed analysis as new and richer datasets become available.

REFERENCES

- Andalon, A. and Pagés, C. (2008). 'Minimum Wages in Kenya', *IZA Discussion Papers 3390*, Institute for the Study of Labor (IZA).
- Basu, A., Chau, N. and Kanbur, R. (2010). 'Turning a Blind Eye: Costly Enforcement, Credible Commitment, and Minimum Wage Laws,' *The Economic Journal*, 120(543), pp. 244-269.
- Bhorat, H., Kanbur, R., and Mayet, N. (2010a). 'A Note on Measuring the Depth of Minimum Wage Violation,' *Cornell University Working Paper*. Available from: <http://dyson.cornell.edu/research/researchpdf/wp/2011/Cornell-Dyson-wp1103.pdf>.
- Bhorat, H., Kanbur, R., and Mayet, N. (2010b). 'Minimum Wage Violation in South Africa,' Forthcoming in *International Labour Review*.
- Foster, J., Greer, J. and Thorbecke, E. (1984). 'A Class of Decomposable Poverty Measures,' *Econometrica*, Vol. 52(3), pp. 761-66.
- Levitt, S. (1997). 'Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime,' *The American Economic Review*, 1997, 87(3), pp. 270-90.
- Levitt, S. (2002). "Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime: Reply" *The American Economic Review*, Vol. 92, No. 4 (Sep., 2002), pp. 1244-1250.
- Ronconi, L. (2010a). "Enforcement and Compliance with Labor Regulations," *Industrial & Labor Relations Review*, Vol. 63, No. 4, article 9. Available at: <<http://digitalcommons.ilr.cornell.edu/ilrreview/vol63/iss4/9>>.
- Ronconi, L. (2010b). 'Globalization, Domestic Institutions and Enforcement of Labor Law: Evidence from Latin America', *IPC Working Paper Series No. 112*.
- Maloney, W. and Nunez, J. (2004). Measuring the impact of minimum wages: evidence from Latin America'. In *Law and Employment. Lessons from Latin America and the Caribbean* edited by J. Heckman and C. Pagès. Cambridge, MA: NBER.